

Two new species of *Neogobius* (Gobiidae) from northeastern Turkey

by

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ABSTRACT. - *Neogobius rizensis* sp. nov. and *Neogobius turani* sp. nov. are described from freshwater streams in north-eastern Turkey. The new species are assigned to *Neogobius* and the subgenus *Ponticola* based on diagnostic features belonging to these taxa. *Neogobius rizensis* differs from all other species of the subgenus *Ponticola* by the following combination of characters: snout 1.6-1.8 orbit of eye, upper lip swollen toward angle of jaws and wide 0.9-1.3 lateral preorbital area, angle of jaws ending below anterior edge of eye and caudal peduncle depth 0.5-0.6 own length. *Neogobius turani* is distinguished by a following combination of characters: head width 1.5-1.6 own depth, snout 1.4-1.5 orbit of eye, upper lip not expanded or slightly expanded and wide 0.7-0.8 of lateral preorbital area, angle of jaws ending below pupil.

RÉSUMÉ. - Deux nouvelles espèces de *Neogobius* (Gobiidae) du nord-est de la Turquie.

Neogobius rizensis sp. nov. et *Neogobius turani* sp. nov. de la région nord-est de Turquie sont décrites. Ces nouvelles espèces sont attribuées au genre *Neogobius* et au sous-genre *Ponticola* sur la base des caractères diagnostiques appartenant à ces groupes. *N. rizensis* diffère de toutes les autres espèces du genre *Neogobius* par la combinaison des caractères suivants : museau contenu 1,6-1,8 fois dans l'orbite oculaire, lèvre supérieure gonflée vers l'angle des mâchoires et contenue 0,9-1,3 fois dans la zone préorbitaire latérale, hauteur du pédoncule caudal contenue 0,5-0,6 fois dans sa propre longueur, l'angle des mâchoires se terminant au-dessous du bord antérieur de l'œil. *N. turani* diffère par la combinaison des caractères suivants : largeur de la tête contenue 1,5-1,6 fois dans sa propre hauteur, museau contenu 1,4-1,5 fois dans l'orbite oculaire, lèvre supérieure peu ou pas développée et contenue 0,7-0,8 fois dans la zone préorbitaire latérale, hauteur du pédoncule caudal contenue 0,5-0,7 fois dans sa propre longueur, angle des mâchoires se terminant au-dessous de la pupille de l'œil.

Key words. - Gobiidae - *Neogobius* - MED - Black Sea - New species - Freshwater.

The Ponto-Caspian genus *Neogobius* Iljin, 1927 consists of fourteen nominal species. Four species groups have been defined as subgenera (*Neogobius* Iljin, 1927, one species; *Apollonia* Iljin, 1926, two species; *Babka* Iljin, 1927, one species and *Ponticola* Iljin, 1927, eleven species) (Miller and Vasil'eva, 2003). Species diagnoses are mostly based on morphometrics (Miller, 2003), and usual gobiid morphological characters, like the lateral line system, were not used for original species description (Pinchuk, 1977; Vasil'eva and Vasil'ev, 1995, 1996). Morphological variability between populations of the same species is probably another reason for variable, unstable and frequently uncertain taxonomy and nomenclatural status of this genus (Ahnelt and Holčík, 1996). *Neogobius rhodioni* Vasil'eva & Vasil'ev, 1994 is the most recently described species regarded as valid. Samples of two unknown *Neogobius* species were collected in the Iyidere stream, Rize, northeastern Turkey, during the field work in August 2004 and in the Aksu stream, Giresun, Turkey, during the field work in September 2004 (Fig. 1). Material collected differs from all other and as a result we describe them as two new species of the genus *Neogobius*.

These species are placed in *Neogobius* Iljin, 1927 (type

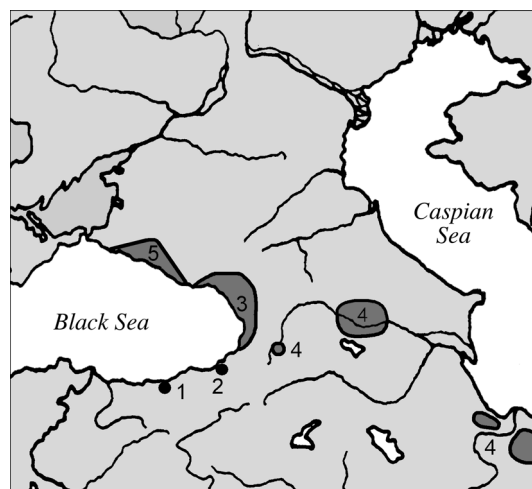


Figure 1. - Geographical distribution of two new species of *Neogobius* and the morphologically closest *Neogobius* species of Caucasian freshwater species group. (1) *Neogobius turani* sp. nov., (2) *N. rizensis* sp. nov., (3) *N. constructor* (Nordmann, 1840), (4) *N. cyrius* (Kessler, 1874), (5) *N. rhodioni* Vasil'eva & Vasil'ev, 1994. [Distribution géographique de deux nouvelles espèces de *Neogobius* et des espèces morphologiquement les plus proches des espèces de *Neogobius* des eaux douces du Caucase].

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species: *Gobius fluviatilis*, Pallas, 1811), based on a redescription of the genus *Neogobius* by Miller and Vasil'eva (2003), by their possession of (1) suborbital papillae in transverse rows, no row *a*, (2) scales normal, (3) no free pectoral rays, (4) anterior nostril tubular but not beyond upper lip, (5) scales on nape, (6) row *5i* and row *6i* separated, row *5i* not below level of row *6i*, (7) four rows before, two rows below row *b*. The new species exhibit characters defined in Miller and Vasil'eva (2003) diagnostic for subgenus *Ponticola* from other *Neogobius* subgenera: (1) nape, predorsal area and upper opercle scaled, (2) posterior nostril close to anterior edge by less than half eye diameter, (3) anterior pelvic membrane lateral lobes well developed, (4) dentary with enlarged conical teeth in outermost and innermost rows, irregular rows of smaller teeth inbetween.

METHODS

Meristic methods as in Miller (1988). Meristic abbreviations: A, anal fin; C, caudal fin; D1, D2, first and second dorsal fins; P, pectoral fin; PD, predorsal scales; TR, scales in transverse series (from origin of A obliquely upwards and rearwards to base of D2); V, pelvic disc. Morphometrics as in Miller (1988), adapted for diagnostic characters of *Neogobius* species used in Miller (2003) and in the present research: Ab, anal fin base; Ad and Aw, body depth and width at anal fin origin; AMw, width of rear edge of anterior membrane; Cl, caudal fin length; CHd, cheek depth (lower border of eye to level of jaws angle); CP and CPd, caudal peduncle length (from vertical of end of A base to origin of the middle rays of C) and depth (minimum); D1b and D2b, first and second dorsal fin base; D1h and D2h, origin to tip of longest first and second dorsal fin ray; E, eye diameter (horizontal); H, head length (snout to midline opposite upper origin of opercle); Hd, head depth (at eyes); Hw, head width (between upper origin of opercles); I, interorbital width (minimum); LAMh, height of anterior membrane lateral lobes; LP, lateral preorbital area (minimum between upper lip and eye); Pl, pectoral fin length; PO, postorbital length; SL, standard length; SN, snout length; SN/A and SN/AN, distance from snout to vertical of anal fin origin and anus; SN/D1 and SN/D2, distance from snout to origin of first and second dorsal fins; SN/V, distance from snout to vertical of pelvic fin origin; ULw, upper lip width (maximum); V/AN, distance from pelvic fin origin to anus; Vd, body depth at V origin; Vl, pelvic fin length. The terminology of lateral-line system follows Sanzo (1911) and Miller (2003). The specimens were sexed by inspection of shape of urogenital papillae. Morphological data on Black and Caspian Seas *Neogobius* species were extracted for the differential diagnosis of the two new species from Georgiev (1966), Ahnelt and Holčík (1996) and Miller (2003) and checked with available comparative mate-

rial of *Neogobius* species.

Abbreviations for institutions are: FFR - Zoological collection, Faculty of Fisheries, Karadeniz Technical University, PMR - Prirodoslovni muzej Rijeka.

Comparative material

Neogobius cyrius (Kessler, 1874). - PMR VP1691, 2 females, 87.0 + 17.7 mm and 88.7 + 17.2 mm, 1 male, 86.5 + 19.1 mm, Hanak, Kura River, north-eastern Turkey, 19 Jun. 2003, leg. S. Engin and D. Turan.

Neogobius constructor (Nordmann, 1840). - PMR VP1692, 2 females, 82.3 + 17.7 mm and 72.1 + 17.0 mm, 1 male, 92.6.5 + 22.7 mm, Borcka, Coruh River, north-eastern Turkey, 29 Sep. 2006, leg. S. Engin and D. Turan.

Neogobius fluviatilis (Pallas, 1814). - PMR VP1313, 3 females, 46.6 + 10.7 mm to 97.9 + 17.3 mm, 2 males, 59.2 + 12.8 mm and 90.8 + 17.8 mm, Drava River, Croatia, 27 Oct. 2004, leg. I. D. Grlica; PMR VP1321, 2 females, 95.4 + 16.4 mm and 112.0 + 19.5 mm, 1 male, 107.6 + 18.1 mm, Drava River, Croatia, Oct. 2004, leg. I. D. Grlica.

Neogobius kessleri Günther, 1861: PMR VP1284, 1 female, 124.4 + 25.3 mm, Drava River, Croatia, 3 Aug. 2004, leg. I. D. Grlica.

Neogobius platyrostris (Pallas, 1814): PMR VP1690, 3 females, 75.3 + 13.5 mm to 79.0 + 12.3 mm, Rize, the Black Sea, north-eastern Turkey, 8 Sep. 2003, leg. S. Engin and D. Turan.

NEOGOBIUS RIZENSIS SP. NOV.

(Fig. 2)

Material

Holotype. - Male, 108.7 + 20.0 mm, FFR 1014, north-eastern Turkey, Rize, the Iyidere stream, 16 Aug. 2004, leg. S. Engin and D. Turan.

Paratypes. - Two females, 86.6 + 14.5 mm and 76.2 + 14.1 mm, FFR 1016, north-eastern Turkey, Rize, the Iyidere stream, 16 Aug. 2004, leg. S. Engin and D. Turan; 2 males, 124.0 + 23.7, FFR 1015 and 104.1 + 21.2 mm, PMR VP1456, north-eastern Turkey, Rize, the Iyidere stream, 16 Aug. 2004, leg. S. Engin and D. Turan.

Diagnosis

Nape scaled completely with cycloid scales; head width 1.4-1.6 depth; interorbit 0.7-0.9 eye diameter; angle of jaws ending below anterior edge of eye; snout 1.6-1.8 orbit of eye; upper lip 0.9-1.3 lateral preorbital area, pelvic length 0.6 abdomen length; anterior membrane with lateral lobes 0.4-0.5 width of the rear edge; caudal peduncle depth 0.5-0.6 own length; two suborbital transverse rows below row *b*; suborbital transverse rows 1, 2, and 3 begin more distant from orbit than row 4; D1 VII; D2 I/17; A I/11-I/13; P 17-18.



Figure 2. - *Neogobius rizensis* sp. nov., holotype, male, FFR 1014. Scale = 10 mm.

Species	<i>Neogobius rizensis</i> sp. nov.					<i>Neogobius turani</i> sp. nov.		
	Holotype	Paratypes				Holotype	Paratypes	
Sex	Males			Females		Male	Females	
n	1	2		2		1	2	
SL (mm)	108.7	104.1-124.0		76.2-86.6		87.8	64.8-82.5	
%SL, H	28.1	28.5	32.7	26.5	27.5	28.2	29.2	30.8
Hw	24.7	25.4	27.5	23.1	24.5	22.6	24.1	25.6
SN/D1	32.9	34.8	35.7	31.4	33.6	31.5	31.8	33.7
SN/D2	49.8	50.6	52.3	49.1	51.2	47.0	48.4	50.0
SN/AN	53.6	55.3	55.4	50.5	53.7	50.2	51.5	52.1
SN/A	58.6	60.1	60.9	58.0	58.9	55.4	56.9	57.0
SN/V	30.6	31.0	31.9	26.1	27.5	27.8	26.4	29.1
CP	18.8	17.5	19.8	18.8	19.0	21.0	17.9	18.4
D1b	17.0	17.3	17.3	17.5	17.6	15.5	14.7	16.2
D2b	35.4	35.7	36.0	35.3	36.9	38.0	35.5	36.2
D1h	13.6	12.9	14.3	11.8	11.8	13.9	12.7	15.9
D2h	16.7	17.1	18.3	12.9	13.8	14.9	15.1	16.1
Ab	22.0	23.8	24.2	22.3	23.0	23.7	24.6	25.2
Cl	19.1	18.5	21.1	16.9	19.6	21.5	21.1	22.5
Pl	22.1	22.8	24.0	18.8	21.9	24.5	26.1	26.3
VI	15.9	15.8	16.9	15.7	17.5	17.0	17.9	18.1
Vd	18.3	19.2	21.4	19.4	20.3	19.5	21.2	21.8
Ad	18.4	16.3	17.6	18.1	18.4	17.4	18.5	19.3
Aw	14.0	12.0	12.8	13.0	14.2	12.8	12.5	14.5
CPd	11.7	10.4	11.2	11.4	11.7	10.8	11.3	12.1
V/AN	25.6	25.7	26.5	25.7	26.2	22.4	23.0	25.2
%CP, CPd	62.3	52.4	64.3	60.7	61.4	51.6	62.9	65.8
%H, SN	31.8	28.2	29.2	29.2	30.3	28.2	29.1	31.7
E	17.7	15.6	15.9	16.8	17.8	20.2	19.7	21.7
PO	44.3	46.8	48.2	52.9	53.0	51.6	46.6	51.2
CHd	32.1	30.0	30.6	25.2	26.9	27.4	24.3	27.6
Hw	87.9	80.3	89.2	87.1	89.1	79.8	82.5	83.1
%E, I	83.3	92.9	94.3	70.0	72.2	52.0	29.8	48.0
%Hd, Hw	139.6	146.5	155.4	157.0	161.5	153.5	151.8	164.2
%LP, ULw	129.5	89.8	112.5	97.2	110.7	78.8	74.3	84.0
%V/AN, VI	62.2	61.4	63.0	60.4	64.1	75.6	71.2	78.4
%AMw, LAMh	36.8	34.8	51.5	39.1	40.4	45.8	37.9	48.3

Table I. - Body proportions of *Neogobius rizensis* sp. nov. and *N. turani* sp. nov. Values for males of *N. rizensis* are range and, in parentheses, mean and standard deviation; values for females of *N. rizensis* and for specimens of *N. turani* are individual, see abbreviations in Methods. [*Proportions du corps de N. rizensis* sp. nov. et *N. turani* sp. nov. Les valeurs pour les mâles de *N. rizensis* sont classées et, entre parenthèses, sont données les moyennes et les déviations standard ; les valeurs pour *N. rizensis* et *N. turani* sont individuelles ; voir abréviations dans Méthodes.]

Description

Morphology. - Body proportions are given in table I. Body moderately elongate, laterally compressed at caudal peduncle. Head large, depressed, wider than deep. Snout longer than eye, with gently oblique profile. Anterior nostril short, flared; posterior nostril with raised rim. Eyes relatively small, around 1/6 of head length, with moderate interorbital

space. Mouth large, angle of jaws ending below anterior edge of eye. Upper lip swollen toward angle of jaws, in the largest specimen less markedly expanded. Branchiostegal membrane attached along entire lateral margin of isthmus from immediately anterior to pectoral margin. Dentary with enlarged conical teeth in outermost and innermost rows, irregular rows of smaller teeth inbetween.

Fins. - D1 VII; D2 I/17; A I/11-I/13 (holotype I/11; paratypes: I/12: 3, I/13: 1); C 14-16 branched rays (holotype 15; paratypes: 14: 1, 15: 1, 16:2), 16-17 segmented rays (holotype 16; paratypes: 16: 1, 17:3); P 17-18 (holotype, both sides, 17 and 18; paratypes, both sides: 17 and 18: 1, 18 and 18: 3), V I/5 + 5/I. Fin-bases and lengths in proportion to standard body length are given in table I. D1 rounded, slightly lower than D2. D2 of almost uniform height. D1 spine V extending when depressed to D2 I in larger specimens. D1 and D2 connected by interdorsal membrane. A originates below 4th to 5th segmented ray of D2, with last ray below vertical of 15th segmented ray of D2. C rounded. P reach beyond vertical of D2. V short, rounded, not reaching anus; lateral lobes of anterior membrane well defined, with pointed tips.

Scales. - Body with ctenoid scales. Head, nape, opercle and base of pectoral fins covered with cycloid scales. Cheek naked. LL 62-77 (holotype, both sides: 67 and 68; paratypes, both sides: 62:1, 64:1, 65:1, 66:2, 67:1, 73:1, 77:1), TR 16-22 (holotype, both sides: 18 and 20; paratypes, both sides: 16:1, 17:1, 19:2, 20:1, 21:2, 22:1), PD 23-27 (holotype 26; paratypes: 23:1, 26:2, 27:1).

Lateral line system. - Head with anterior and posterior oculoscapular, and preopercular canals. Anterior and posterior oculoscapular canals with pair of pores σ ; single λ and κ ; and paired ω , α , β , ρ , θ , τ . Preopercular canals paired, with γ , δ , ϵ . Pores relatively small, all circular except elongated σ , λ , κ and α .

Some rows of sensory papillae irregularly doubled or tripled in some specimens, sometimes expanded in clusters of papillae. This results in high variability in the number of sensory papillae in these rows of variable occurrence. Rows and the number of sensory papillae (Fig. 3): (I) preorbital: snout with five rows in median preorbital series: upper row r^1

(7-9), and lower row r^2 (7-10) between pores σ and λ . Upper row s^1 (10-22) below pore s , in some specimens doubled, lower s^2 (11-15) in some specimens partially doubled, and s^3 as cluster above upper lip (14-19). Lateral series c in four parts: superior (c^2) below PN (12-19) in two or three longitudinal rows or as cluster; middle transversal c^1 (9-12) close to AN, single or doubled; inferior upper c_2 (12-15) longitudinal above lips, single or doubled; and lower c_1 (8-11) in two or three rows between lips and row l . (II) suborbital: seven transverse (1-7) and two longitudinal rows (b , d) of sensory papillae on cheek. Rows 1-4 before longitudinal row b ; rows 5 and 6 divided by b in superior ($5s$, $6s$) and inferior sections ($5i$, $6i$); in one specimen three rows below row b , middle row divided in two distinct and overlapping parts; row 7 near α (l : 22-30, 2: 21-31, 3: 21-27, 4: 23-33, $5s$: 8-16, $5i$: 17-24, $6s$: 7-15, $6i$: 22-27; the specimen with three rows below b : $5i$: 7 and 9 + 7, $6i$: 28). Rows 1, 2, and 3 begin at different distance from orbit, but more distant from orbit than row 4; the beginning of rows 5 and 6 near orbit in some specimens doubled or tripled. Row 1 ending downwards following the border of the upper lip; row 2 ending above angle of the jaw; rows 3, 4 and $5i$ ventrally ending near d^3 ; row $6i$ passing d^3 . Longitudinal row b (21-28) long, extending forwards below pupil. Longitudinal row d long, separable in two or three parts: d^1 (11-16) following the border of lips, d^2 (5-6) below or behind lower end of row 2 of variable presence, d^3 (25-34) beginning behind row 2 and nearly reaching $6i$. (III) preoperculo-mandibular: external row e distinctly divided into anterior (e^1 : 47-60), and posterior sections (e^2 : 52-62); internal row i not clearly divided and doubled or tripled in frontal part (i : 90-138); mental row f clustered (15-20). (IV) oculoscapular: four longitudinal rows (x^1 , x^2 , la^1 , la^2) and seven transversal rows (z , y , q , tr , as^1 , as^2 , as^3). Anterior longitudinal row x^1 (18-22) from above pore γ to transversal row tr ; posterior longitudinal row x^2 (6-9) above τ ; row z (8-11) with lower end near pore γ ; row q (4-7) transversal or oblique, beginning behind pore ρ ; transversal row tr in front and above of pore θ (4-7), the papillae of rows x^1 , q and tr between pores ρ and θ more or less compacted together; transversal row y (8-14) behind pore τ , in some specimens oblique, in one specimen clustered; transversal axillary rows as^1 (19-23), as^2 (14-18), as^3 (13-17) long, longitudinal rows la^1 (2-5) and la^2 (2-6) present as variably scattered papillae between upper parts of rows as . (V) opercular: transverse row ot partially doubled (44-51); superior longitudinal row os (24-28); and inferior longitudinal row oi (19-27). (VI) anterior dorsal: transversal row n behind pore ω (12-15); transversal rows o (10-17) widely separated, in one specimen each row o divided in two distinct and horizontally overlapping rows; longitudinal row g (10-13) originated behind and distant from midpoint of row o ; transversal row m (8-10) below posterior part of row g ; transversal row h (16-26) divided in two sections.

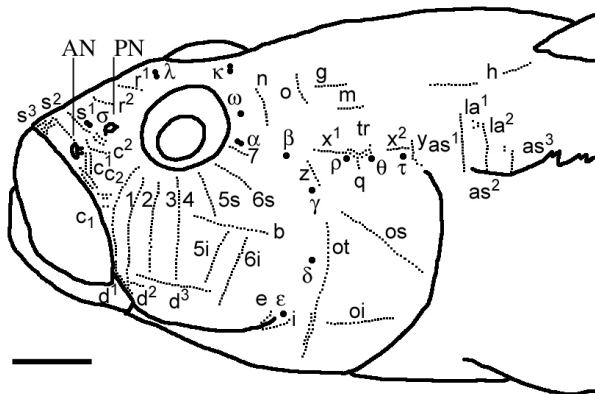


Figure 3. - *Neogobius rizensis* sp. nov., head lateral-line sensory papillae and canal pores of holotype, male, FFR 1014. AN, PN: anterior and posterior nostrils; see other terminology in text. Scale = 5 mm. [Papilles et pores du canal sensoriel de la ligne latérale de la tête chez l'holotype. AN, PN : narine antérieure et postérieure. Pour les autres termes, voir le texte. Échelle = 5 mm.]

Coloration. - No distinct sexual dichromatism is evident on the specimens. In life: Upper part of body brown, with five fawn narrow saddles. Lateral sides brown, with seven to eight fawn blotches along lateral midline. Two distinct fawn marks in upper and lower posterior corner of caudal peduncle. Row of fawn blotches below lateral midline connected to underside. Underside, breast and belly, including ventral midline of caudal peduncle fawn. Head pigmented as body, more densely on nape than opercle. D1 with one lower longitudinal band, and two upper longitudinal rows of brown dots; D2 with several ill defined longitudinal rows of brown dots; C with several ill defined vertical curved brown rows; P, V and A mottled brown. Preserved specimens: The pattern of the skin pigmentation was almost completely lost at the time when the preserved specimens were analysed. The coloration of the preserved specimens differs from that of living specimens in the dominant colour turning from brown to greyish fawn. In some specimens, part of skin has kept more intensive pigmentation, randomly and probably as the result of preserving conditions. Fins mottled (P, V, A) or dotted (D1, D2, C) dark grey.

Etymology

The name of the species is derived from name of the city of Rize, in the north-eastern Turkey, near the type locality.

Ecology

Neogobius rizensis was collected in a stream with fresh, running water and bottom covered with rounded pebbles. The collecting site was at the altitude of 11 m above the sea level and 3.4 km inland from the sea. The syntopic fish species with *N. rizensis* in Iyidere stream were *Alburnoides bipunctatus* (Bloch, 1782); *Barbus tauricus* Kessler, 1877; *Capoeta banarescui* Turan et al., 2006; *Chalcalburnus chalcoides* (Güldenstädt, 1772); *Chondrostoma colchicum* Derjugin, 1899; *Cobitis splendens* Erkakan et al., 1998; *Lamprolaima lanceolata* Kux & Steiner, 1972; *Leuciscus cephalus* (Linnaeus, 1758); *Liza aurata* (Risso, 1810); *Mugil cephalus* Linnaeus, 1758; *Rutilus frisii* (Nordmann 1840); *Salmo labrax* Palas, 1811.

Geographical distribution

Neogobius rizensis is presently known only from the Iyide-

dere stream drainage (40°57'55"N, 40°23'16"E), located 18 km west of Rize and 52 km east of Trabzon.

NEOGOBIUS TURANI SP. NOV.

(Fig. 4)

Material

Holotype. - Male, 87.8 + 18.9 mm, FFR 1017, north-eastern Turkey, Giresun, the Aksu stream, 6 Sep. 2004, leg. S. Engin and D. Turan.

Paratypes. - Female, 82.5 + 18.6 mm, PMR VP1457, north-eastern Turkey, Giresun, the Aksu stream, 6 Sep. 2004, leg. S. Engin and D. Turan; female, 64.8 + 13.7, FFR 1018, north-eastern Turkey, Giresun, the Aksu stream, 6 Sep. 2004, leg. S. Engin and D. Turan.

Diagnosis

Nape scaled completely with cycloid scales; head width 1.5-1.6 depth; interorbit 0.3-0.5 eye diameter; angle of jaws ending below pupil; snout 1.4-1.5 orbit of eye, upper lip 0.7-0.8 lateral preorbital area; pelvic length 0.7-0.8 abdomen length; anterior membrane with lateral lobes 0.4-0.5 width of the rear edge; caudal peduncle depth 0.5-0.7 own length; two suborbital transverse rows below row *b*; suborbital transverse rows 1, 2, and 3 begin more distant from orbit than row 4; D1 V-VI; D2 I/17-I/19; A I/13; P 19.

Description

Morphology. - Body proportions are given in table I. Body moderately elongate, laterally compressed at caudal peduncle. Head large, depressed, wider than deep. Snout longer than eye, with gently oblique profile. Anterior nostril short, flared; posterior nostril with raised rim. Eyes of moderate size, around 1/5 of head length, with relatively narrow interorbital space. Mouth large, angle of jaws ending below anterior edge of eye. Upper lip not expanded or slightly expanded toward angle of jaws. Branchiostegal membrane attached along entire lateral margin of isthmus from immediately anterior to pectoral margin. Dentary with enlarged conical teeth in outermost and innermost rows, irregular rows of smaller teeth in-between.

Fins. - D1 V-VI (holotype V, paratypes VI); D2 I/18-I/19



Figure 4. - *Neogobius turani* sp. nov., holotype, male, FFR 1017. Scale = 10 mm.

Some rows of sensory papillae irregularly doubled or tripled in some specimens, sometimes expanded in clusters of papillae. This results in high variability in the number of sensory papillae in these rows of variable occurrence. Rows and the number of sensory papillae (Fig. 5): (I) preorbital: snout with five rows in median preorbital series: upper row r^1 (8-10), and lower row r^2 (6-11) between pores σ and λ , each doubled in two specimens, the third specimen with three dis-

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row *g*; transversal row *h* (19-23) divided in two sections.

Coloration. - No distinct sexual dichromatism is evident on the specimens. In life: Upper part of body dark purple. Lateral part dark purple with numerous pale yellowish spots. Underside, breast and belly fawn. The pattern of the skin pigmentation is the same as in the preserved specimens and it is described for preserved specimens. Preserved specimens: Upper part of the body dark brown with yellowish-brown blotches. Lateral part brown, with numerous yellowish-brown spots. Underside, breast, belly and ventral midline of caudal peduncle brown or light brown. Small dark brown blotches present along lateral midline. Head dark brown. D1 with two longitudinal rows of brown dots; D2 with scattered brown dots; C with several ill defined curved vertical rows of dots; P, V and A greyish and poorly dotted.

Etymology

The new species is named after our colleague, Davut Turan, who helped one of us (SE) to collect *Neogobius* samples in the freshwaters of the north-eastern Turkey, and for his contribution to the knowledge of the Turkish fish fauna.

Ecology

Neogobius turani was collected in a stream with fresh, running water and bottom covered with rounded pebbles. Collecting site was at the altitude of 8 m above the sea level and 1.2 km away from the sea. The syntopic fish species with *N. turani* in Aksu stream were *Barbus tauricus* Kessler, 1877; *Capoeta banarescui* Turan et al., 2006; *Chalcalburnus chalcoides* (Güldenstädt, 1772); *Leuciscus cephalus* (Linnaeus, 1758); *Neogobius fluviatilis* (Pallas, 1814).

Geographical distribution

Neogobius turani is presently known only from the Aksu stream (40°53'55"N, 38°26'33"E), located 8 km east of Giresun and 93 km west of Trabzon.

DISCUSSION

Among described *Neogobius* species, *N. rizensis* and *N. turani* are morphologically closest to Caucasian freshwater *Neogobius* species of the subgenus *Ponticola*. During the nineties this Caucasian freshwater species group, considered for two decades to be a subspecies of marine *Neogobius platyostrius* named *N. platyostrius constructor* (Vasil'eva & Vasil'ev, 1995), was split in three geographically separate and morphologically more or less distinguishable species: *Neogobius constructor* (Nordmann, 1840), *Neogobius cyrius* (Kessler, 1874), *N. rhodioni* Vasil'eva & Vasil'ev, 1994 (Vasil'eva and Vasil'ev, 1994, 1995; Vasil'eva, 1995) (Fig. 1). Habitat preferences and geographical distributions of presently described species suggest a close relationship to

this species group. However, the newly described species differ from the published morphological characters of the three Caucasian freshwater species and inhabit geographically distinct freshwaters (Vasil'eva and Vasil'ev, 2003a, 2003b, 2003c). *N. rizensis* is easily distinguishable from the three Caucasian freshwater species by following characters: interorbit 0.7-0.9 (vs 0.5-0.75 *N. constructor*, 0.5 *N. cyrius*) eye diameter, snout 1.6-1.8 orbit of eye (vs 1.5 *N. constructor*, 1.3-1.4 *N. cyrius*) and angle of jaws ending below anterior edge of eye (vs below anterior half of eye *N. constructor* and *N. cyrius*, below pupil *N. rhodioni*). *N. turani* is easily distinguishable from the three Caucasian freshwater species by following characters: interorbit 0.3-0.5 (vs 0.5-0.75 *N. constructor*, 0.66 *N. rhodioni*) eye diameter, snout 1.4-1.5 orbit of eye (vs 1.7 *N. rhodioni*), upper lip not expanded or slightly expanded toward angle of jaws: 0.7-0.8 lateral pre-orbital area (upper lip expanded toward angle of jaws in *N. constructor*, *N. rhodioni* and usually in *N. cyrius*) and angle of jaws ending below pupil (vs below anterior half of eye *N. constructor* and *N. cyrius*). The two new species differ between themselves in general shape, morphometrics, fin meristics, coloration and lateral line system (λ pore as transversal furrow and row *6i* ending in the level of *d* in *N. turani*). Some characters of these species differ from the description of any *Neogobius* species (Miller, 2003). *N. turani* has λ pore as transversal furrow with two openings on the ends in all three specimens. The three *N. rizensis* specimens and all *N. turani* specimens have *d* separable in three parts, with *d*² below or behind lower end of row 2 and *d*³ beginning behind row 2.

Additional morphological differences among the Caucasian freshwater *Neogobius* species could be searched in the lateral line system that is undescribed for *N. constructor*, *N. cyrius* and *N. rhodioni* and in diagnostic characters of head, lips and pelvic fin that were provided just qualitatively for these species (Vasil'eva and Vasil'ev, 1995). These descriptions also lack some fin and scale meristic characters. On the other hand, differential diagnoses of Vasil'eva and Vasil'ev (1995) included identification characters like the coloration of body sides, which are variable within the species and overlap between the species. Therefore, these differential diagnoses in Vasil'eva and Vasil'ev (1995) do not guarantee the identification for each individual specimen of these species. Some important characters differ for the same species among recently published data on the Caucasian freshwater *Neogobius* species in a degree out of the possible range of intraspecific variability. Caudal peduncle depth in own length was reported for *N. cyrius* as 0.7-0.9 (Ahnelt and Holčík, 1996) and as 0.3-0.35 (Vasil'eva and Vasil'ev, 2003b). All these confirm the necessity of additional morphological data for all nominal *Neogobius* species, following methodology explained above.

Neogobius genus, with 16 species including the presently

described species, is one of the largest Ponto-Caspian gobiid genera (Miller and Vasil'eva, 2003). Unfortunately, detailed geographical researches like in Vasil'eva (1995), and researches with detailed morphological descriptions, like the lateral line system in Ahnelt and Duchkowitsch (2001) are rare. Up to date knowledge of *Neogobius* genus, including the previously unpublished data, was summarised in Miller (2003). This review provides a good starting point for future researches on *Neogobius* species. However, the known data on this genus are insufficient and systematic observations, like those proposed for *Knipowitschia* populations of Mediterranean freshwaters (Kovačić, 2005) are needed in order to provide: (1) data on external morphology for descriptions of species morphological variability and for species diagnoses based on high weight external morphological characters; (2) taxonomical delimitation of these species would enable studies of ecological and geographical distribution of *Neogobius* species, based on systematically collected and correctly identified samples; (3) knowledge of ecological and geographical distribution of *Neogobius* species is necessary for taking any steps towards conservation; (4) microtaxonomical dilemmas that would probably remain, as well as macrotaxonomy of this genus, would be resolved using taxonomical characters different from external morphology.

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REFERENCES

- AHNELT H. & M. DUCHKOWITSCH, 2001. - The lateral line system of two Ponto-Caspian gobiid species (Gobiidae, Teleostei): A comparison. *Folia Zool.*, 50: 217-230.
- AHNELT H. & J. HOLČIK, 1996. - Distribution of two species of the genus *Neogobius* (Pisces: Gobiidae) in the catchment area of the southern Caspian Sea. *Acta Univ. Carol. Biol.*, 40: 99-114.
- GEORGHIEV J.M., 1966. - Composition d'espèce et caractéristique des Gobiidés (Pisces) en Bulgarie. *Izv. Inst. Ryb. Stop. Okeanogr. Varna*, 7: 159-228. (in Russian)
- ILJIN B.S., 1927. - A guide to the gobies (family Gobiidae) of the Azov and Black seas. *Tr. Azov.-Chernom. Nauch.-Prom. Eksped.*, 2: 128-143. (in Russian)
- KESSLER K., 1874. - Description of fishes belonging to families common to Black Sea and Caspian Sea. *Tr. St Petersburg. Obshch. Estest.*, 5: 191-324. (in Russian)
- KOVAČIĆ M., 2005. - A new species of *Knipowitschia* (Gobiidae) from Dalmatia, Croatia. *Cybium*, 29: 275-280.
- MILLER P.J., 1988. - New species of *Corcyrogobius*, *Thorogobius* and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). *J. Nat. Hist.*, 22: 1245-1262.
- MILLER P.J. (ed.), 2003. - The Freshwater Fishes of Europe, Vol. 8/I. 404 p. Wiebelsheim: Aula Verlag.
- MILLER P.J. & E.D. VASIL'EVA, 2003. - *Neogobius* Iljin, 1927. In: The Freshwater Fishes of Europe, Vol. 8/I (Miller P.J., ed.), pp. 163-171. Wiebelsheim: Aula Verlag.
- NORDMANN A., 1840. - Observations sur la faune pontique. In: Voyage dans la Russie méridionale et la Crimée, par la Hongrie, la Valachie et la Moldavie. Exécuté en 1837, par Mr. Anatole de Démidoff, Vol. III, pp. 355-635. Paris. E. Bourdin et Cie.
- PINCHUK V.I., 1977. - Classification of gobies of the genera *Gobius* Linné (native species), *Neogobius* Iljin and *Mesogobius* Bleeker. *Vopr. Ikhtiol.*, 17: 587-596. (in Russian)
- SANZO L., 1911. - Distribuzione delle papille cutanee (organi ciattiforme) e suo valore sistematico nei Gobi. *Mitt. Zool. Stn. Neapel*, 20: 249-328.
- VASIL'EVA E.D., 1995. - Differentiation of Caucasian gobies, presently grouped in the subspecies *Neogobius platyrostris* (Gobiidae), based on an analysis of museum collections. *J. Ichthyol.*, 35: 1-20.
- VASIL'EVA E.D. & V.P. VASIL'EV, 1994. - On the systematics of Caucasian gobies (Gobiidae): Craniological and karyological analysis and distribution by biotope of some populations from the Black Sea and caspian basins. *J. Ichthyol.*, 34: 14-25.
- VASIL'EVA E.D. & V.P. VASIL'EV, 1995. - Systematics of Caucasian freshwater gobies (Gobiidae) in the light of contemporary data, with a description of a new species, *Neogobius rhodioni*, sp. nov. *J. Ichthyol.*, 35: 139-157.
- VASIL'EVA E.D. & V.P. VASIL'EV, 1996. - The description of *Neogobius iljini* sp. nov. within former *N. kessleri* (Gobiidae, Pisces). *Acta Univ. Carol. Biol.*, 39: 261-270.
- VASIL'EVA E.D. & V.P. VASIL'EV, 2003a. - *Neogobius constructor* (Nordmann, 1840). In: The Freshwater Fishes of Europe, Vol. 8/I (Miller P.J., ed.), pp. 193-202. Wiebelsheim: Aula Verlag.
- VASIL'EVA E.D. & V.P. VASIL'EV, 2003b. - *Neogobius cyrius* (Nordmann, 1840). In: The Freshwater Fishes of Europe, Vol. 8/I (Miller P.J., ed.), pp. 203-211. Wiebelsheim: Aula Verlag.
- VASIL'EVA E.D. & V.P. VASIL'EV, 2003c. - *Neogobius rhodioni* (Nordmann, 1840). In: The Freshwater Fishes of Europe, Vol. 8/I (Miller P.J., ed.), pp. 370-376. Wiebelsheim: Aula Verlag.

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